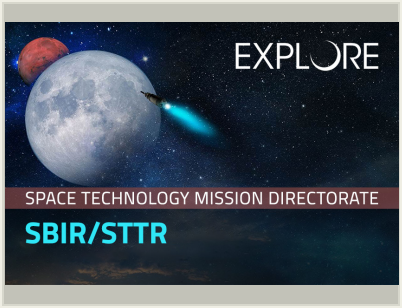
Enhanced Codeset Passive Wireless SAW Sensor-Tags and System, Phase I

Completed Technology Project (2011 - 2012)

Project Introduction

The proposed project will develop a set of at least 100 passive wireless surface acoustic wave (SAW) RFID sensor-tags for near-simultaneous remote monitoring of groups of conventional sensors. Coded SAW sensor-tags have been demonstrated by ASR&D under NNX09CE49P to be capable of providing a passive wireless interface to external sensors, including switches, thermistors, and strain gages, as well as external sensors that generate voltages. These sensor-tags consist of a SAW device with an antenna attached to one port and sensor(s) and reference impedance(s) connected to the other ports. RF signals of the correct frequency range are reflected off of the surface wave device, and their reflection characteristics are modified by changes in the impedance/voltage of the attached sensor(s). Under NNX10RA68P a set of 32 individually identifiable coded SAW temperature sensor devices that avoids the serious problems with code collision seen in conventional SAW RFID systems was developed using CDMA and TDMA. Wireless measurement confirmed the ability to selectively detect any single sensor out of the combined response of multiple sensors. The proposed effort will incorporate direct sequence spread spectrum (DSSS) codes into SAW tag devices also using time diversity, to produce sets of more than 100 individually identifiable coded sensor-tags. DSSS coding has been demonstrated by researchers at the University of Maine to produce sets codes with good auto- and cross-correlation properties. These sensor-tags will be tested to verify that they can be used as an interface to external pressure sensors and strain gages. This project will also evaluate the wireless reader system architectures commercially available and currently being developed at ASR&D and at other research institutions to determine what system architecture is most beneficial for operation with the codesets developed. This will form the basis of recommendations for future system development work.



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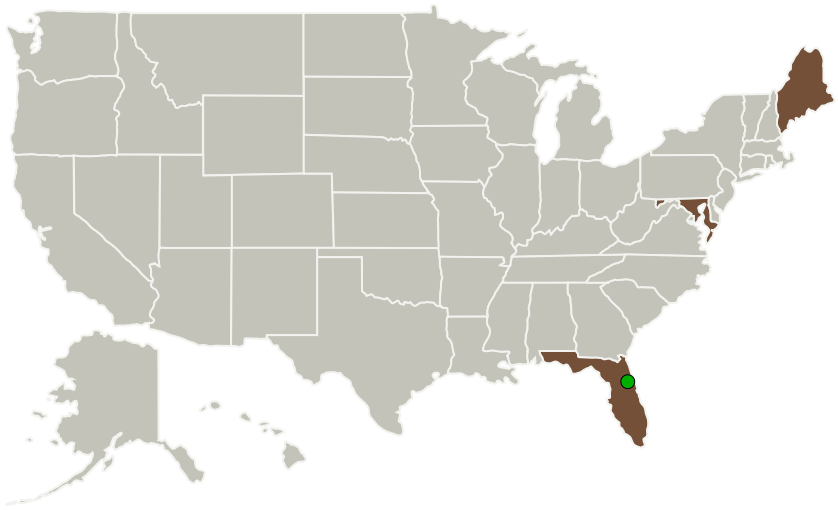
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
SenSanna Incorporated (formerly Applied Sensor Research & Development)	Lead Organization	Industry Women-Owned Small Business (WOSB), Veteran-Owned Small Business (VOSB)	Arnold, Maryland
Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida
University of Maine	Supporting Organization	Academia	Orono, Maine

Primary U.S. Work Locations	
Florida	Maine
Maryland	

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

SenSanna Incorporated (formerly Applied Sensor Research & Development)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jacqueline H Hines

Enhanced Codeset Passive Wireless SAW Sensor-Tags and System, Phase I

Completed Technology Project (2011 - 2012)

Project Transitions

February 2011: Project Start

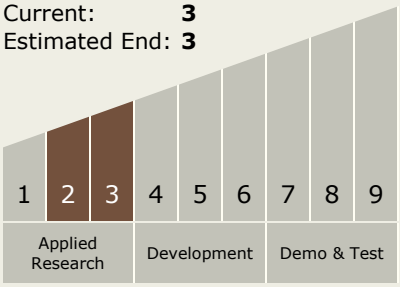
February 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138134)*

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.2 Test and Qualification
    - TX13.2.7 Test Instruments and Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System